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VERIFICATION OF TRANSLATION

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I verify that the attached English translation is a true and correct translation made by me of the attached specification in the German language of International Application PCT/EP2005/000137;

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Headphone

The present invention concerns a headphone with a single-sided curved band suspension means and an inclined sound transducer arrangement. The invention further concerns a wireless headphone as well as a corresponding charging station for the wireless headphone and finally a wireless headphone system.

Wireless devices such as for example wireless headphones generally have a rechargeable battery. In order to recharge that battery the wireless headphone must have electrical contact surfaces which can be of a strongly or weakly resilient configuration. Strongly resilient contacts are often of relatively long dimensions. In the case of weakly resilient contacts however the contacts have to be brought together in positively locking relationship so that the battery can be correspondingly charged up.

Accordingly the object of the present invention is to provide for secure electrical contacting for charging up battery-operated devices.

That object is attained by a wireless headphone as set forth in claim 1, a charging station as set forth in claim 3, a mobile terminal device as set forth in claim 6 and a charging station as set forth in claim 7.

Thus there is provided a wireless headphone having charging contacts in the headphone band and at least one magnet in the headphone band. The invention also concerns a charging station for a corresponding wireless headphone. In that case the charging station has bars as an electrical feed line for electrical charge contacting of the wireless headphone.

The invention also concerns a mobile terminal device having a rechargeable battery, at least one charging contact for charging up the battery and a magnet in the region of the charging contacts. For charging

up the mobile terminal device there is provided a charging station which has charging contacts and magnets in the region of the charging contacts.

The invention is based on the idea of providing for attraction between two electrical contact surfaces by magnetic attraction. In that case a magnet on one or both sides of the contact surfaces can provide for the necessary attraction.

In that way it is possible to enable a longer service life to be achieved as the contact springs are functionally more delicate and can easily bend. A magnetically boosted contacting effect makes it possible to achieve higher degrees of structural freedom. In addition contacting of that kind can take place independently of the position involved.

Figures 1 through 10 show details of a wireless headphone system with a charging station and a wireless headphone. Figures 11 through 13 show details of a headphone.

Figure 1 shows a plan view of a headphone according to the first embodiment. In this case the headphone has two transducers 20, 30 and a headband 10.

Figure 2 shows a side view of a headband 10 of Figure 1. Magnets M are arranged in the headband 10.

Figure 3 shows a side view of a headphone in accordance with the first embodiment. Both magnets M and also electrical contacts EK for charging up the headphone are arranged in the headband 10.

Figure 4 shows a side view of a headband of the headphone of Figure 3.

Figure 5 shows a view of a charging station for a wireless headphone. The charging station 100 is connected to a voltage supply by way of a cable 400. Feet 200 are arranged at the underside of the charging station. The charging station can be switched on and off by means of an on/off switch 300.

Figure 6 also shows a plan view of a charging station in accordance with a first embodiment. In addition to the charging station as shown in Figure 5 the charging station as shown in Figure 6 has a bar 900 which serves for the electrical feed. Accordingly the bar 900 which for example in

the form of an open electrical feed line has a region 910 which serves to receive a headband of a headphone as shown in one of Figures 1 and 2. There is also provided an insulated portion 920 on the feed line 900 in order to insulate the two electrical feed lines from each other.

To increase the stability of the feed line 900 a buffer element 140 (for example of rubber) can be arranged between the charging station 100 and the feed line 900.

Figure 7 shows a further side view of a charging station as shown in Figure 6.

Figure 8 shows a front view of a charging station from Figure 6. Shown in this case is the charging station 100 as well as the feed line 900 with the insulated portion 920.

Figure 9 shows a further headphone, in particular a wireless headphone, which can be used together with the charging station shown in Figures 6 through 8.

Figure 10 shows a diagrammatic view of a charging station 100 with a corresponding headphone in accordance with the first embodiment. The (in particular wireless) headphone has a band 10 with transducers 20, 30. Two electrical contacts EK are arranged at the underside of the band 10. Magnets M are arranged above the electrical contacts. Preferably the magnets and the electrical contacts are insulated from each other. In addition Figure 10 shows a charging station having an electrical feed line 900. In this case the spacing between the electrical feed lines 900 and the electrical contacts EK in the band 10 of the headphone is such that, when the headphone is placed on the electrical feed line, the electrical contacts EK come into contact with the electrical feed line 900 so that the headphone or the batteries disposed therein can be charged up by way of the electrical feed line 900 and the electrical contacts EK.

That wireless headphone system is based on a novel charging concept in which the headband of the headphone is simply put into the charging device. Latching engagement does not have to be taken into consideration in that respect, and equally no consideration has to be given to right or left.

The wireless headphone is distinguished in that the charging contacts EK are preferably disposed in the headband at the middle of the headband 10. The headband 10 also has magnets M which are preferably disposed in the proximity of the electrical contacts EK.

In this case those magnets afford a magnet-boosted contact. Even if the electrical contacts in the headband are not placed exactly on the electrical feed lines or bars of the charging station, automatic placement of the contacts occurs due to the magnetic attraction of the magnets in the headband, that is to say the bars or electrical feed lines at least in portion-wise manner comprise magnetisable material.

The charging station 100 for the wireless headphone has two bars 900 which project out of the charging station. Those two bars serve as an electrical feed line for the electrical contacts EK in the wireless headphone. Consequently the spacing between the bars 900 at the free ends thereof must substantially correspond to the spacing of the electrical contacts EK in the headband of the headphone. The two bars 900 can also be connected together at their free ends if that connection is of an electrically insulating nature at 920.

The charging station can also serve as a transmitting/receiving station for the wireless headphone.

Alternatively the electrical contacts and the magnets can also be arranged in a neck band of a behind-the-head headphone.

The above-described principles of the invention, that is to say a magnetically boosted charging contact, can also be used for an inductive charging operation, that is to say without electrical contact, in which case fixing or the improvement thereof can be effected by means of magnets.

In the case of wireless headphones with a rechargeable battery the batteries are generally charged up by taking off the headphone and positioning the headphone on a suitable charging station. In general the batteries to be charged up do not have to be removed but electrical contacting is effected by way of contacts which are arranged both in the headphone and also in the charging station. As already described hereinbefore, resilient contacts are frequently used in order to ensure a

good contacting action. If however reliable contact is to be produced by way of a weakly resilient contact surface, then the contacts must be brought together in positively locking relationship, such as for example by guides.

In accordance with the present invention a small magnet is arranged at the contact surfaces in the headphone so that the headphone rests securely on a charging loop of a charging station. In that case the holding force is determined by the configuration of the magnets. In that respect the contact surfaces do not necessarily have to be resilient.

As an alternative to the above-described embodiment a magnet-boosted contacting action can be achieved by the magnets being arranged at or in a feed line or at or in the charging loop of the charging station.

The underlying concept of the invention, namely magnet-boosted contacting of two electrical contacts for charging up a battery, can be applied not only to wireless headphones with the corresponding charging stations, but also to any mobile terminal devices and their charging stations (for example mobile telephones, PDAs, portable audio players, portable video players, portable games consoles etc), pocket calculators, portable dictating machines, pocket lamps, digital cameras which are supplied with power by rechargeable batteries. A corresponding consideration also applies to wireless microphones, pocket transmitters, in-ear headphones, hearing aids (in each case also wireless), cordless domestic appliances and all other electrical or electronic devices which have a rechargeable power source.

Figures 11 through 13 show details of a headphone in accordance with a second embodiment. Inclined sound transducer arrangement is made possible by inclined positioning of the sound transducer arrangement.

The headphone with the band suspension means which is curved at one side and the inclined sound transducer arrangement permits ideal sound channelling with little resonance phenomena.